

## PATENT COOPERATION TREATY

PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

RECEIVED

09/437,726  
APR 26 2000LAW OFFICES OF  
JONATHAN ALAN QUINE

Bui



Applicant's or agent's file reference 02-029220PC	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 99/ 26772	International filing date (day/month/year) 09/11/1999	(Earliest) Priority Date (day/month/year) 10/11/1998
Applicant  MAXYGEN, INC. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 5 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☒ **Certain claims were found unsearchable** (See Box I)

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☐ the text is approved as submitted by the applicant.

☒ the text has been established by this Authority to read as follows:

**MODIFIED RIBULOSE 1,5-BISPHOSPHATE CARBOXYLASE/OXYGENASE**

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/ 26772

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☒ Claims Nos.: 15-18 (incomplete)  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:  
see FURTHER INFORMATION sheet PCT/ISA/210

3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.



## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

Continuation of Box I.2

Claims Nos.: 15-18 (incomplete)

Present claims 15-18 relate to a polynucleotide comprising a gene characterised by the expression "shuffled", which describes a process of nucleic acid rearrangement that may either occur naturally during evolution (see Wolter F.P. et al., Plant Physiol., 1997, 114 (1), p.131-6) or may be carried out by man as claimed in present claims 1-9. In the present case, the claims so lack support, and the application so lacks disclosure, that a meaningful search over the whole of the claimed scope is impossible. Consequently, the search has been carried out for those parts of the claims which appear to be clear and disclosed, namely those parts relating to a polynucleotide comprising a sequence encoding a Rubisco Form I L subunit gene shuffled by a method as claimed in claims 1-9 and linked to a selectable marker gene and further optionally linked to upstream and downstream flanking recombinogenic sequences, whereby said polynucleotide codes for an enzyme with a  $K_m$  for  $CO_2$  ( $O_2$ ) which is significantly lower (higher) than the respective  $K_m$  of any naturally-occurring rubisco enzyme.

The applicant's attention is drawn to the fact that claims, or parts of claims, relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure.

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26772

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C12N9/88 C12N15/29 C12N15/82 C12N5/14 C12P19/34  
C12Q1/68

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C12N C12P C12Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	SPREITZET R.J.: "GENETIC DISSECTION OF RUBISCO STRUCTURE AND FUNCTION" ANNUAL REVIEW OF PLANT PHYSIOLOGY AND PLANT MOLECULAR BIOLOGY, vol. 44, 1993, pages 411-434, XP000864484	1-4, 10-12, 15-18
X	page 412, line 15 - line 34 page 415, line 6 -page 423, line 42 ---	15-18
Y	WO 97 35966 A (MAXYGEN INC.) 2 October 1997 (1997-10-02)  page 47, line 19 - line 22; claims 1,5,12-19  --- -/--	1-4, 10-12, 15-21



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

28 March 2000

Date of mailing of the international search report

12/04/2000

Name and mailing address of the ISA

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Schönwasser, D

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/26772

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	<p>LARIMER F.W. ET AL.: "Rhodobacter capsulatus Calvin cycle carbon dioxide fixation operon: fructose-1,6-/sedoheptulose-1,7-bisphosphate aldolase (cbbA) gene, partial cds, Form II ribulose-1,5-bisphosphate carboxylase/oxygenase (cbbM) gene, complete cds, and Calvin cycle operon: pentose-5-phosphate-3-epimerase (cbbE), etc."</p> <p>EMBL DATABASE ENTRY RC23145; ACCESSION NO. U23145, 14 April 1995 (1995-04-14), XP002132955</p>	19-21
A	<p>-----</p> <p>CRAMERI A ET AL: "DNA SHUFFLING OF A FAMILY OF GENES FROM DIVERSE SPECIES ACCELERATES DIRECTED EVOLUTION" NATURE, vol. 391, 15 January 1998 (1998-01-15), pages 288-291, XP000775869 ISSN: 0028-0836 page 288, column 2, line 24 - line 28 page 289, column 1, line 4 -page 290, column 1, line 2</p> <p>-----</p>	1-26
A	<p>JAMET E. ET AL.: "Genes encoding the small subunit of RUBISCO belong to two highly conserved subfamilies in Nicotianeae" JOURNAL OF MOLECULAR EVOLUTION, vol. 33, no. 3, September 1991 (1991-09), pages 226-236, XP000864454 the whole document</p> <p>-----</p>	1-26
A	<p>WOLTER F.P. ET AL.: "rbcS genes in Solanum tuberosum: Conservation of transit peptide and exon shuffling during evolution" PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF USA, vol. 85, February 1988 (1988-02), pages 846-850, XP000877412</p> <p>-----</p>	1-26
A	<p>FLACHMANN R. ET AL.: "Mutations in the Small Subunit of Ribulose-1,5-Bisphosphate Carboxylase/Oxygenase Increase the Formation of the Misfire Product Xylulose-1,5-Bisphosphate" PLANT PHYSIOLOGY, vol. 114, no. 1, May 1997 (1997-05), pages 131-136, XP000877382</p> <p>-----</p>	1-26

# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/US 99/26772

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9735966 A	02-10-1997	US 5837458 A	17-11-1998
		AU 2337797 A	17-10-1997
		AU 2542697 A	17-10-1997
		CA 2247930 A	02-10-1997
		EP 0932670 A	04-08-1999
		EP 0906418 A	07-04-1999
		WO 9735957 A	02-10-1998
		AU 713952 B	16-12-1999
		AU 1087397 A	19-06-1997
		CA 2239099 A	05-06-1997
		EP 0876509 A	11-11-1998
		EP 0911396 A	28-04-1999
		JP 2000500981 T	02-02-2000
		WO 9720078 A	05-06-1997

